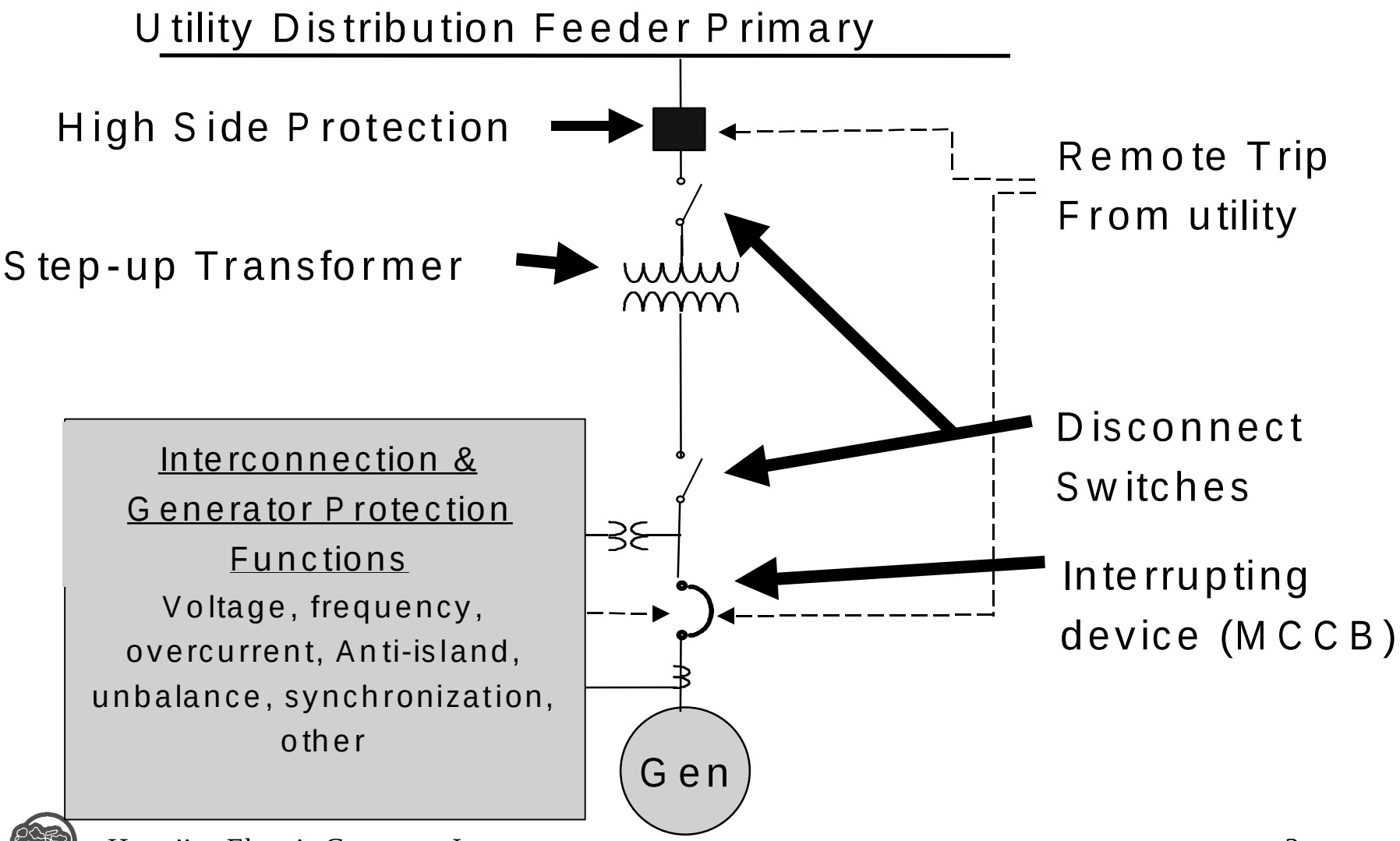
Interconnection

Wind Working Group
April 8, 2002

WHAT ARE INTERCONNECTION STANDARDS?

Interconnection standards are specific technical requirements for paralleling distributed generation (DG) with the utility system.

Components of DG Interconnection



WHY DO WE NEED INTERCONNECTION STANDARDS?

- Interconnection standards are necessary to ensure safety, reliability, and power quality.
- Afford consistent application of requirements.
- Help streamline review and approval processes.
- Allow higher levels of DG penetration.

Power System Impacts of DG

- Voltage Regulation
- Power Quality
- Reliability
- Operational Safety
- System Loading
- System Efficiency

Diesel Generators

DG can help in all of the above areas – or it can worsen performance in all the above areas!

HECO's Standards

- **Based on national standards and guidelines**
- **Incorporates features to account for our unique island systems**
- **Filed with the PUC in January 2002**

What Are Addressed By The Interconnection Standards?

- **General Interconnection Guidelines**
- **Design Requirements**
- **Operating Requirements**
- **Protection, Synchronizing, and Control Requirements**

Sample of Interconnection Standards

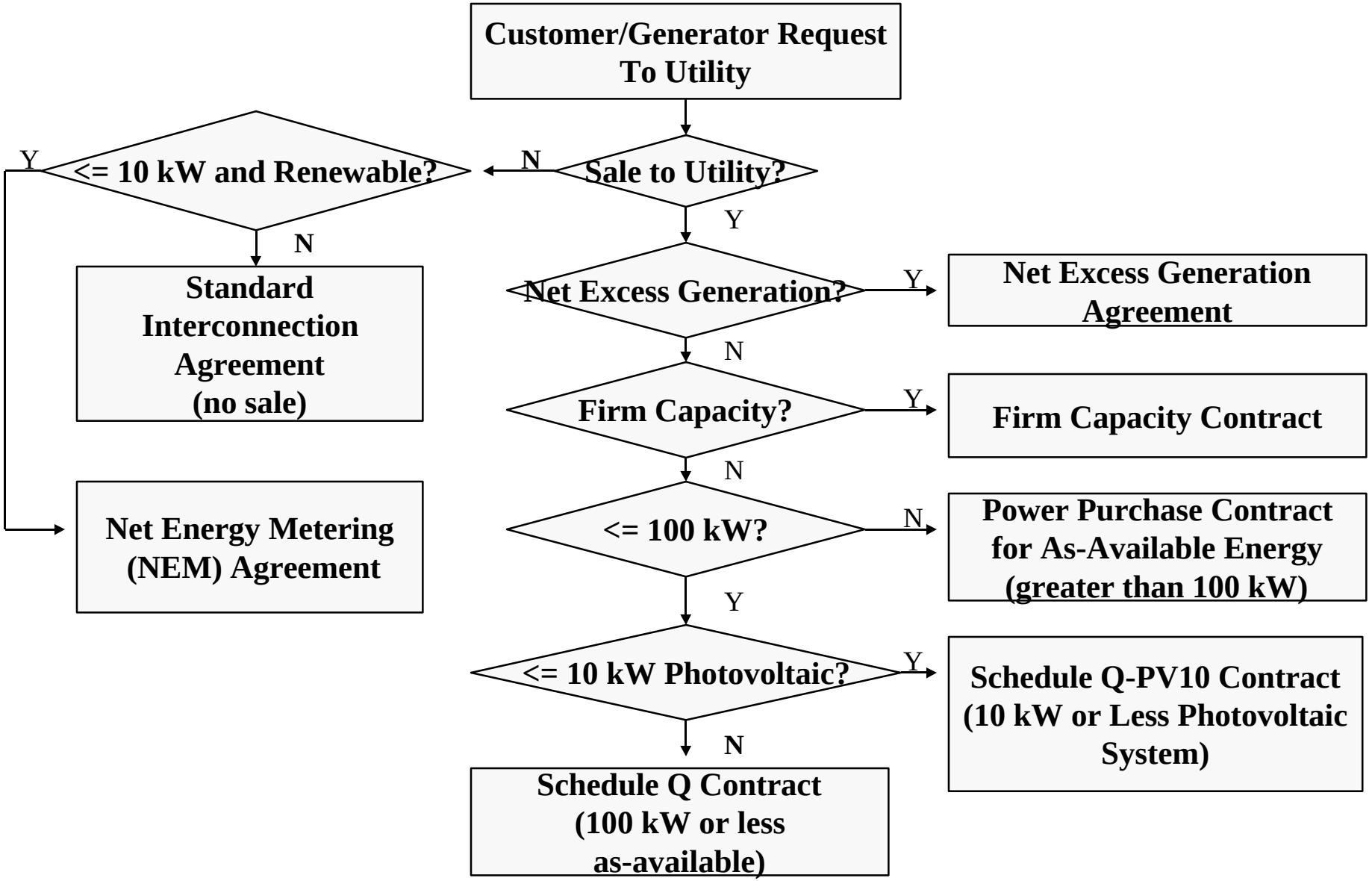
- **Isolation Device - A disconnecting device with a visible break that is accessible and lockable in the open position by authorized utility personnel**
- **Anti-Islanding Provisions**
- **Interrupting Device – A circuit breaker or interrupting device capable of interrupting the maximum available fault current at the site**
- **Protective relaying and coordination of settings**

Disconnect Device

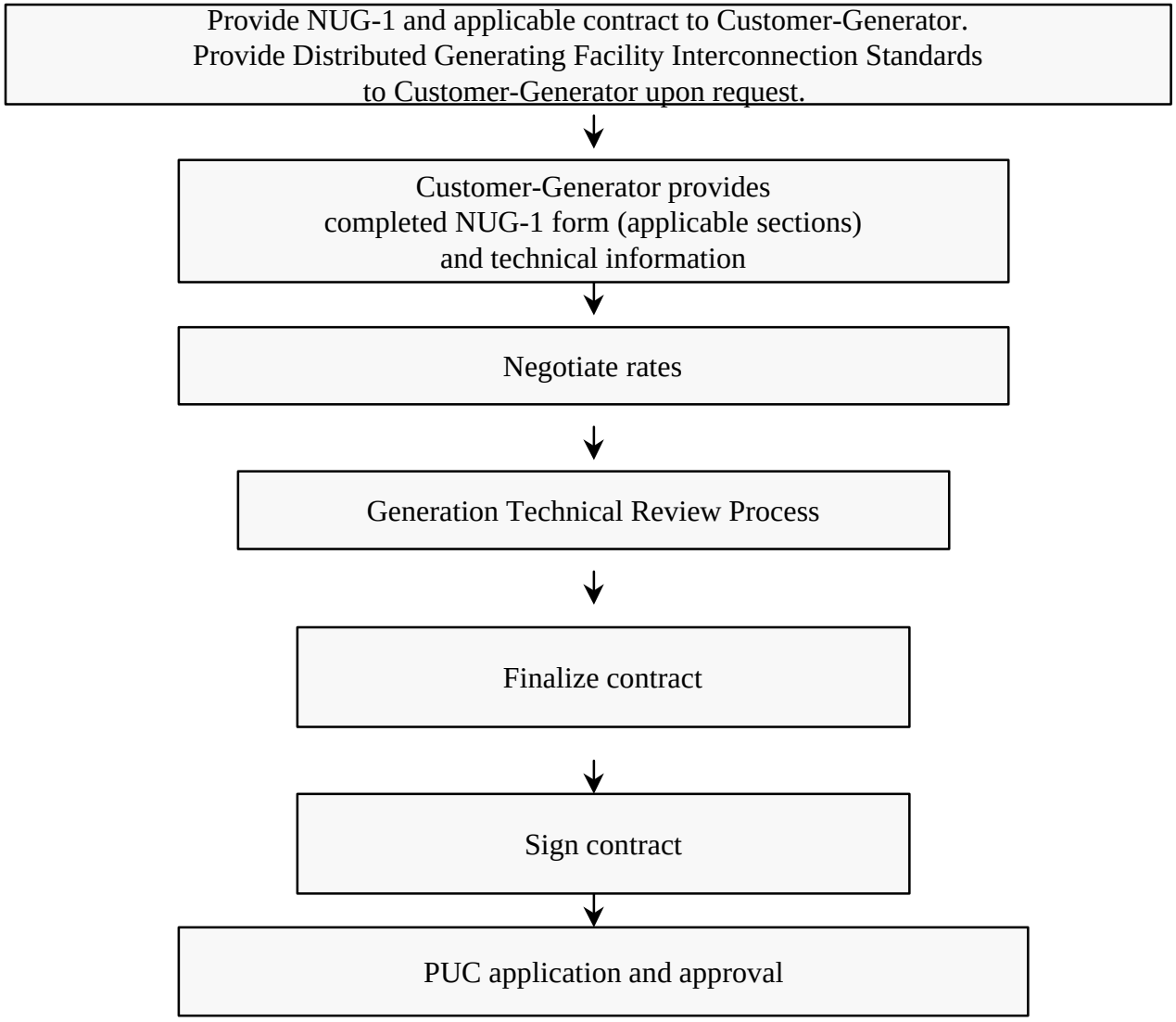
Performance Standards for Wind Farms

- **Ramp rate**
- **Power fluctuation rate**
- **Voltage flicker**
- **Harmonics**

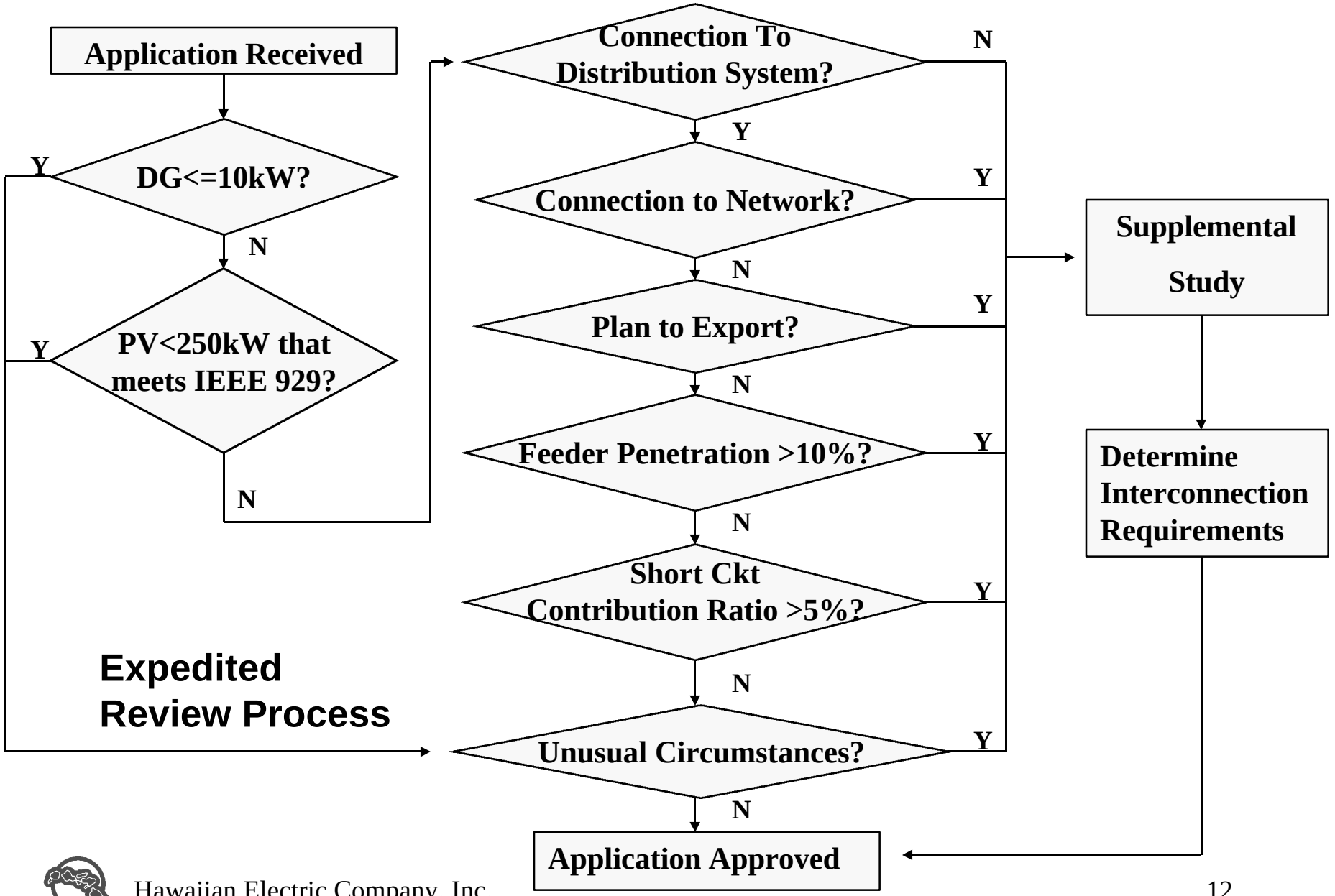
Process for Interconnecting Generators



Typical Contract Process



Generation Technical Review Process



Supplemental Study Considerations

- Location, size, and type of DG
- Distribution circuit voltage and load
- Protection devices on circuit
- Voltage regulation equipment on circuit
- Transformer connection type
- Fault current contribution of DG
- Aggregate DG penetration on circuit
- Export of power

Typical Contract Provisions

- Customer-generator and facility information
- Interconnection equipment requirements
- System protection and operating requirements
- Personnel and system safety
- Permits, approvals, and licenses
- Pricing
- Term of agreement
- Other terms and conditions

SUMMARY

- **Interconnection standards detail the specific technical requirements for interconnecting DG with the utility system**
- **Inappropriate interconnection can harm people and equipment, and reduce reliability and power quality**
- **HECO's interconnection standards follow national guidelines and codes**

Damaged Equipment

SUMMARY

- **Following Standards may help increase allowable penetration levels for DG on utility systems.**
- **Talk to your utility before purchasing or installing equipment.**
- **They will help you through the interconnection process, which includes a technical review and execution of an appropriate contract.**